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3 **AN IMPROVED METHOD FOR CREATING, MODIFYING, AND**  
4 **PLAYING A CUSTOM PLAYLIST TO BE PLAYED BY A DIGITAL**  
5 **AUDIO/VISUAL ACTUATOR DEVICE**

6 **CROSS REFERENCE TO RELATED APPLICATIONS**

7 The subject matter of the present application is related to copending United  
8 States Application S.N. <sup>09</sup> 08/074,681 (~~Decklet No. 50L2089~~), filed  
9 contemporaneously with this application and assigned to Sony Corporation and to  
10 Sony Electronics, which is expressly incorporated herein by reference.

11 **FIELD OF THE INVENTION**

12 This invention relates generally to digital audio/visual actuation devices, and  
13 more particularly to an improved method for creating, modifying, and playing a  
14 customized playlist that may be utilized by such digital audio/visual actuation devices  
15 at any later time.

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17 **BACKGROUND OF THE INVENTION**

18 A problem commonly encountered with digital audio/visual actuation devices  
19 capable of playing two or more "tracks", or collections of information, in a  
20 consecutive manner is how to play tracks in an order other than the order in which  
21 the tracks are normally to be played, as usually dictated by the order in which the  
22 tracks are stored on a digital storage device such as a compact disc (CD). This  
23 concern is addressed by creating "playlists" to be played by the digital audio/visual  
24 actuator device that may be customized to the tastes and needs of the individual  
25 user. The tracks that comprise the playlist may be songs or other audio clips, video

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clips, or audio/visual clips and are typically identified by the table of contents (TOC), a database containing such information as the number of tracks and length of each track. Digital audio/visual actuator devices include, but are not limited to, optical actuator devices, video actuator devices, audio actuator devices, or combinations thereof, such as, for instance, boomboxes. Examples of such digital audio/visual actuator devices include the compact disc (CD) player, the digital audio tape (DAT) player, the cassette recorder, the digital visual disc/mini disc (DVD/MD) player, and other audio/visual equipment.

Consider, as an example, the creation of a playlist for a CD player. As is known in the art, the CD player function may be fulfilled by a CD player having no other function or by audio/visual (A/V) equipment having a compact disc player function, as well as other A/V functions. The user of a CD player may create a customized playlist that selects tracks to be played in an order different from their chronological order on a CD. This may include, in the case of a single CD, rearranging the order in which tracks of the CD are played and additionally, in the case of a multiple CD player capable of housing multiple CDs simultaneously, selecting tracks from the multiple CDs in an order other than the order in which the tracks are stored on the CD and also in an order that is not bound by the position of one CD vis-à-vis another CD. The user of the CD player may accordingly create a customized playlist that lists CD tracks in the order in which the user would like to hear them played regardless of the order in which they are stored on one or more CDs housed in the CD player.

CD players may possess the means for the user to create a custom playlist. Typically, however, CD players, as is the case with other digital audio/visual actuator devices, offer an extremely weak and cumbersome human interface for this task. The user must rely on the front panel controls of the CD player itself to create a playlist. The front panel controls of a CD player are awkward and counterintuitive to use, especially when one considers that they typically have multiple functions that cannot be dedicated just to the task of creating a playlist. As a result, keys on the front panel of the CD player may not dedicated to the playlist creation function and thus may be counterintuitive to use for this purpose. Exacerbating this awkwardness is the fact that keys to be used for creating a playlist may not even have alpha-numeric properties.

A further difficulty with utilizing a custom playlist is that the created playlist is itself stored in volatile memory of the digital audio/visual actuator device and not in a permanent digital storage device such as a CD. Because the playlist is stored in volatile memory, it is lost whenever power to the CD player is lost, whether by turning off the digital audio/visual actuator device or accidentally losing power. The playlist must therefore be recreated every time power is lost to the digital audio/visual actuator device. Moreover, storing the created playlist in the volatile memory of the digital audio/visual actuator device requires that the playlist must be actuated by the digital audio/visual actuator device itself and not by a more convenient means, such as a remote control unit.

In light of the above discussion, it is clear that there exists a need in the art for

1 several improvements over the prior art way of creating a customized playlist to be  
2 played by a digital audio/visual actuator device. First, there is a need to be able to  
3 overcome the problems associated with the typically weak and cumbersome human  
4 interface required to create a customized playlist on a digital audio/visual actuator  
5 device so that the user may easily and readily create the customized playlist.  
6 Second, there is a need to be able to create a customized playlist that is  
7 permanently available to the user, unlike the prior art playlist that is stored in volatile  
8 memory. Third, there is a need in the art to be able to actuate the customized  
9 playlist by means, such as a remote control unit, other than the digital audio/visual  
10 actuator device.

1       **SUMMARY OF THE INVENTION**

2               It is accordingly an object of the invention to create a customized playlist to be  
3       played by a digital audio/visual actuator device.

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5               It is further an object of the invention to be able to easily create the  
6       customized playlist to be played by a digital audio/visual actuator device, thereby  
7       overcoming the problems associated with the weak human interface required by the  
8       prior art to create a playlist.

9  
10              It is yet another object of the invention to create a customized playlist for a  
11       digital audio/visual actuator device that is permanently available to the user, unlike  
12       the prior art in which the playlist is stored in volatile memory.

13  
14              It is still yet another object of the invention to create a customized playlist to  
15       be played by a digital audio/visual actuator device that may be actuated by means  
16       other than by the digital audio/visual actuator device, such as by a remote control  
17       unit.

18  
19              Therefore, according to the present invention, a custom playlist capable of  
20       being played by a digital audio/visual actuator device may be easily created and  
21       modified by an external device that uses a user interface, such as a graphical user  
22       interface, characterized as being user-friendly. Alternately, the software of the digital  
23       audio/visual actuator device can create and modify the custom playlist with a  
24       minimum of user intervention required. The custom playlist is created by adding one

1 or more desired tracks to a custom playlist file that is then saved in non-volatile  
2 memory of the digital audio/user actuator device.

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4 Once the playlist is created, it may then be easily modified if so desired at any  
5 future time by performing such functions as adding tracks, deleting tracks, and  
6 rearranging tracks of the playlist through the external device. Again, these functions  
7 may be performed by the user through the interface of the external device or by  
8 software resident on the digital audio/visual actuator device. Following any  
9 modification of the playlist, it is again saved to non-volatile memory of the digital  
10 audio/visual actuator device. The playlist may be played by the digital audio/visual  
11 actuator device at any time after it has been created and saved. According to an  
12 aspect of the present invention, the digital audio/visual actuator device may also  
13 play the playlist upon receipt of appropriate commands from a remote control unit in  
14 communication with the digital audio/visual actuator device.

1                   **BRIEF DESCRIPTION OF THE DRAWINGS**

2                   The novel features believed characteristic of the invention are set forth in the  
3                   claims. The invention itself, however, as well as the preferred mode of use, and  
4                   further objects and advantages thereof, will best be understood by reference to the  
5                   following detailed description of an illustrative embodiment when read in conjunction  
6                   with the accompanying drawing(s), wherein:

7  
8                   **Figure 1** is a block diagram of communications between an audio/visual  
9                   actuator device and an external device, according to the present invention;

10  
11                  **Figure 2** is an example of a table of contents (TOC) database, as it might  
12                  appear on a GUI of a PC, according to the present invention;

13  
14                  **Figure 3** is a block diagram of communications between an audio/visual  
15                  actuator device, an external device, and the Internet, according to the present  
16                  invention;

17  
18                  **Figure 4** is a block diagram of communications between an audio/visual  
19                  actuator device, an external device, and a remote control unit, according to the  
20                  present invention;

21  
22                  **Figure 5** is a flow chart of the steps for creating, modifying and playing a  
23                  custom playlist, according to the present invention;  
24

1           **Figure 6** is a flow chart of the steps for creating and saving a custom playlist,  
2 according to the present invention;

3  
4           **Figures 7a and 7b** are GUI representations of a searching operation that may  
5 be performed to limit the number of tracks from which the playlist is to be created,  
6 according to the present invention;

7  
8           **Figure 8** is a flow chart of the steps for playing a custom playlist, according to  
9 the present invention;

10  
11           **Figure 9** is a GUI representation of the playlist icon, according to the present  
12 invention; and

13  
14           **Figure 10** is a GUI representation of various options available for modifying  
15 the playlist, according to the present invention.



## DESCRIPTION OF THE INVENTION

The present invention creates a playlist, a collection of information tracks capable of being played on a digital audio/visual actuator device, on a device external to the digital audio/visual actuator device. The entire playlist or individual tracks of the playlist may be downloaded from the external device to the digital audio/visual actuator device which can then play the created playlist immediately or at some future time. The tracks that comprise the playlist may be songs or other audio clips, video clips, or audio/visual clips. Digital audio/visual actuator devices include, but are not limited to, optical actuator devices, video actuator devices, audio actuator devices, or combinations thereof, such as, for instance, boomboxes. Examples of such digital audio/visual actuator devices include the CD player, the digital audio tape (DAT) player, the cassette recorder, the digital visual disc/mini disc (DVD/MD) player, and other audio/visual equipment.

The playlist is created on an external device, typically a personal computer (PC), and then is downloaded from the external device to the digital audio/visual actuator device for use at some later time. The external device communicates the playlist to the digital audio/visual actuator device by downloading the playlist file from the external device to the CD player via a connection between the two, such as by a physical cable, a radio frequency (RF) or wireless connection, or an infra-red (IR) connection. The digital audio/visual actuator device has storage capability sufficient to receive and permanently store the playlist file for later use. The software on the digital audio/visual actuator device is enhanced, if necessary, so that it is capable of accepting one or more playlists, storing and playing them as if they were playlists of

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1 actual digital storage devices, such as CDs. Once the playlist is stored, it may be  
2 played by the digital audio/visual actuator device at any time as if it were a playlist of  
3 an actual digital storage device. Unlike the prior art, the playlist file is not stored in  
4 volatile memory, so that even after turning off the digital audio/visual actuator device  
5 or otherwise losing power the playlist file is available for selection or modification.  
6 Playlists may therefore be later modified as desired.

7  
8 Referring to **Figure 1**, a block diagram of communications between an  
9 audio/visual actuator device 10 and an external device 14, such as a PC, according  
10 to the present invention, is shown. Audio/visual actuator device 10 is capable of  
11 playing a custom playlist to be created on the external device 14. Two-way  
12 communications between audio/visual actuator device 10 and external device 14 are  
13 accomplished by a two-way communications link 12 which may be a physical cable,  
14 a radio frequency (RF) or wireless connection, or an infa-red (IR) connection. The  
15 two-way communications link between audio/visual actuator device 10 and external  
16 device 14 facilitates creation of the custom playlist. Information about the tracks that  
17 may be added or deleted from the playlist, such as the table of contents (TOC)  
18 database containing information such as the number of tracks and length of each  
19 track, is provided to external device 14 from audio/visual actuator device 10. An  
20 example of the TOC database, as it might appear on a GUI of a PC, is illustrated in  
21 **Figure 2**. Once the playlist is created or modified, it is downloaded by external  
22 device 14 to audio/visual actuator 10.

23  
24 Referring to **Figure 3**, it will be noted that external device 14 may also receive

1 information pertinent to creating or modifying the playlist from external information  
2 sources 18, such as the Internet or world wide web, over two-way communications  
3 link 16. For instance, music CDs are now available over the Internet and tracks from  
4 such CDs may be added to the custom playlist to be played by audio/visual actuator  
5 device 10. It should be further noted that, as shown in **Figure 4**, external device 14  
6 may download the custom playlist to remote control unit 22 via communications link  
7 20 in addition to downloading the playlist to audio/visual actuator device 10. In this  
8 way, it is possible for remote control unit 22 to control audio/visual actuator device  
9 10 by sending to it appropriate control commands concerning playing the playlist.

11 **Figure 5** is a flowchart that illustrates the steps for creating, playing and  
12 modifying a custom playlist, according to the present invention. Decision Block 30  
13 inquires as to whether the user desires to create a custom playlist using the present  
14 invention. If the response is yes, then a custom playlist is created on external device  
15 14 and saved to non-volatile memory in the digital audio/visual actuator device 10 at  
16 Block 40. If the response is no, the flow proceeds to Decision Block 50. At Decision  
17 Block 50, the user must decide whether the playlist that has been created and saved  
18 is to be modified. If the playlist is to be modified, then, at Block 60, the playlist is  
19 modified and again saved. Next, at Decision Block 70, the user must decide  
20 whether to play the playlist. The playlist is played at Block 80 or the flow terminates  
21 if the playlist is not to be played.

22  
23 Creation of the playlist 40 will now be described. Referring to **Figure 6**, at  
24 Block 42 the user chooses a track to be added to the playlist file that will be saved

by the digital audio/visual actuator device. Selection of tracks to be added to the playlist may be accomplished in any number of ways. For instance, the user may choose to limit the number of tracks from which the playlist may be created by limiting the number of available tracks to those sung by a certain artist, i.e. "Elvis", or those having a title that contains the certain term, i.e. "love". This step is illustrated in the GUI representations of **Figures 7a** and **7b** in which the word "love" is searched for in the title of various tracks available to be added to the playlist. Identifying information about this track, such as the track index from the TOC of the digital storage device on which the track is stored, that is capable of identifying the track is saved to the playlist file at Block 43. Next, the user must decide whether another track is to be added to the playlist at Decision Block 44. If another track is to be added to the playlist, the flow returns to Block 42. If, however, another track is not to be added to the playlist the flow continues to Decision Block 45. At Decision Block 45, the user is given the opportunity to delete any tracks added to the playlist that the user wishes to now delete from it. This is accomplished at Block 46. If no tracks are to be deleted from the playlist, the flow proceeds to Block 47. At Block 47, the playlist is saved in non-volatile memory in digital audio/visual actuator device 10.

Alternately, the playlist may be created with little user intervention at all. The digital audio/visual actuator device can be programmed to recognize those tracks that are played the most frequently and to create the custom playlist to include them. For instance, the digital audio/visual actuator device can choose the ten tracks that the user has played the most within a given time period, such as within the last

1 week. The digital audio/visual actuator device may further have a select button on  
2 its control panel that the user may press to add a track that is being played to the  
3 playlist. Additionally, the playlist may be created by a shuffle operation that simply  
4 shuffles in random order a number of tracks. The shuffle operation may be  
5 accomplished using a random number generator, for instance, in the manner known  
6 in the art.

7  
8 The custom playlist may be modified, or edited, in any number of ways.  
9 Referring back to Figure 5, after the playlist is created and saved the user may  
10 modify the playlist before it is played, as shown at Blocks 50 and 60. As with  
11 creation of the playlist, modification of the playlist is performed by the external  
12 device 14. The external device 14 has a human interface that is much more  
13 conducive to this operation than is the control panel of digital audio/visual actuator  
14 device 10. The playlist may be edited by deleting tracks from it, rearranging the  
15 tracks, or adding tracks to it. Rearranging the tracks may be accomplished by a  
16 shuffle operation, previously discussed. It is understood that modification of the  
17 playlist may also occur after the playlist is played.

18  
19 After the playlist has been created, modified, if so desired, and stored to the  
20 digital audio/visual actuator device, it may be played at any time in the future by the  
21 digital audio/visual actuator device 10. Because the playlist has been saved to non-  
22 volatile memory of the digital audio/visual actuator device, unlike the prior art, the  
23 user need not worry about the playlist being lost. Referring now to **Figure 8**, the  
24 steps of Block 80 for playing the playlist are shown. First, at Block 82, the entry of

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1 the next track to be played is obtained from the playlist stored in digital audio/visual  
2 actuator device 10. The track is found by the TOC and track index unique to it, as  
3 shown at Block 84. Next, at Block 86, the track is played by digital audio/visual  
4 actuator device 10. At Decision Block 88, if not all tracks of the playlist have been  
5 played, the flow is returned to Block 82. If, however, all tracks of the playlist have  
6 been played, the flow is terminated. The above steps for playing the playlist will  
7 typically be handled by digital audio/visual actuator device 10 with no user  
8 intervention required.

9  
10 The following example, in which it is assumed that the digital audio/visual  
11 actuator device is a CD player and the external device is a PC, illustrates operation  
12 of the present invention. The external device is capable of collecting and managing  
13 information about many different CDs that may be contained in the CD player.  
14 Playlists are created on a PC, for instance, by pointing and clicking on icons of a  
15 graphical user interface (GUI) that are representative of desired CD tracks, thereby  
16 selecting those tracks to be added to the playlist. **Figure 9** provides an example of  
17 what the GUI on a PC might look like; in Figure 9, on the right side of the screen, the  
18 icon for selecting the playlist function is clearly shown. Tracks are easily identified  
19 by their track index in the TOC of a CD, a database containing the number of tracks  
20 and length of each track on the CD. The reader is referred again to Figure 2 which  
21 shows a GUI example of a TOC of a music CD, by way of example. Using the TOC  
22 and track index, it is possible to place a certain track of a CD in any position of the  
23 custom playlist being created.  
24

1           Once the playlist has been created, the PC communicates the playlist to the  
2 CD player by downloading the playlist file from the external device PC to the CD  
3 player via a physical cable, a radio frequency (RF) or wireless connection, or an infra-  
4 red (IR) connection. For instance, the PC can communicate via an RS232 port  
5 connected to an interface device capable of facilitating communications between two  
6 serial devices, such as a PC VISION TOUCH box that uses an A1 protocol or an S-  
7 Link protocol standard. The CD player contains storage capability, such as a  
8 random access memory (RAM), and a central processing unit (CPU) so that the  
9 playlist may be received and permanently stored for later use. The software on the  
10 CD player is enhanced to accept one or more playlists, store them and play them  
11 just as if they were virtual CDs. Once the playlist is stored, it may be played by the  
12 CD player at any time as if it were a virtual CD. Alternatively, the external device,  
13 such as a PC, could be used to command the CD player to play a certain track, one  
14 at a time.

15  
16           As previously discussed, the custom playlist may be modified in a variety of  
17 ways. Modification of the playlist is performed by external device 14 and may  
18 include deleting tracks from the playlist, rearranging tracks in the playlist, and adding  
19 tracks to the playlist. Referring to **Figure 10**, a sample GUI illustrates the various  
20 options for modifying the playlist, including saving, loading, deleting, clearing, or  
21 shuffling the playlist.

22  
23           An important feature of the present invention is the ease with which a  
24 customized playlist may be created, modified and played. The external device, such

1 as a PC or other similar device, is used to manage the CD collection in the CD  
2 player so that the tracks of each CD in the CD player is known. Thus, the external  
3 device knows, at any given time, the location of each track on a CD in the CD player.  
4 A graphical user interface (GUI) of the external device, such as a PC GUI, provides  
5 for the creation, modification, and selection of a customized playlist to be made with  
6 simplistic ease. This is quite different from the prior art approach that does not use a  
7 GUI but instead relies on the front panel controls of the CD player which are typically  
8 counter-intuitive and awkward to use, as noted above. The present invention is  
9 especially useful when creating a recording of information contained within a digital  
10 storage device of a first digital audio/visual actuator device to a second digital  
11 audio/visual actuator device. An example of this would be to use a CD player to  
12 record songs from a playlist of music CDs to a mini disk (MD) player or a cassette  
13 tape recorder.

14  
15 While the invention has been particularly shown and described with reference  
16 to a preferred embodiment, it will be understood by those skilled in the art that  
17 various changes in form and detail may be made therein without departing from the  
18 spirit and scope of the invention.